FMC Idaho LLC, Pocatello, Idaho

POND 15S
READILY IMPLEMENTABLE WORK PLAN FOR GAS EXTRACTION AND TREATMENT

June 10, 2014

MWH

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SECTION 1 INTRODUCTION

1.1 REQUIRED GAS EXTRACTION AND TREATMENT AT RCRA POND 15S

In a letter from EPA dated May 23, 2014 regarding Modification to Require Work Plans for Gas Extraction and Treatment and Additional Monitoring at RCRA Ponds 15S and 16S; CERCLA Unilateral Administrative Order for Removal Action, Docket No. CERCLA 10-2010-0170 ("UAO," effective July 12, 2010), EPA required FMC to prepare "Readily Implementable Work Plans" for gas extraction and treatment at Ponds l5S and l6S for submittal to EPA by June 10, 2014 such that they can be implemented within 48 hours upon approval. The Readily Implementable Work Plans must also include an air (surface scan and appurtenance) and perimeter pipe monitoring schedule and frequency that provides for more frequent monitoring when concentrations are rising or elevated above levels requiring the initiation of gas extraction and treatment, and for less frequent monitoring based upon falling concentrations.

1.2 SCOPE OF THIS WORK PLAN

The scope of this plan is to provide the Readily Implementable Work Plan for gas extraction and treatment at Pond 15S as directed by the May 23rd EPA letter. As gas extraction and treatment has previously been performed at Ponds 16S and 15S, separate Readily Implementable Work Plans have been prepared and submitted for each of these RCRA ponds which are consistent with earlier approved work plans.

This *Pond 15S Readily Implementable Work Plan for Gas Extraction and Treatment* is based largely on the previously EPA-approved gas extraction and treatment system (GES) unit design and operating procedures specified in the Pond 18A Interim Work Plan for Gas Extraction and Treatment (March 8, 2013).

1.3 PROJECT ORGANIZATION

The key personnel associated with the performance of the project described in this Work Plan and associated responsibilities presented in the following subsections.

1.3.1 EPA On-Scene Coordinator

The EPA On-Scene Coordinator, as specified in the UAO, is Mr. Greg Weigel, of the Emergency Response Unit, Office of Environmental Cleanup, Region 10.

1.3.2 FMC Remediation Director

The FMC Remediation Director, Ms. Barbara Ritchie, is responsible for overall program implementation, quality and reporting. The Remediation Director is responsible for setting up and procuring the services and ensuring that FMC receives the quality and scope of work described in the contract documents. The Remediation Director is the only person with the authority to change the scope of the project, which is done through the process of change orders and contract modifications.

1.3.3 MWH Project Coordinator

The Project Coordinator will perform overall engineering oversight of the project. The Project Coordinator will interact and communicate directly with the FMC Remediation Director on a regular basis to ensure that the requirements of the contract documents are met and that regulatory issues relating to the UAO are addressed. The MWH Project Coordinator will be Rob Hartman.

1.3.4 KW Health and Safety Manager

The Health and Safety Manager (HSM) has overall responsibility for implementation and maintenance of the site Health and Safety Plan. The HSM is responsible for monitoring and assessing hazardous/unsafe situations, developing measures to assure personnel safety, maintaining the emergency response organization and equipment per the RCRA Contingency Plan, performing job planning safety analyses (JPSA) on job tasks, and training of employees commensurate with their responsibilities. The HSM is also responsible to ensure unsafe acts or conditions are corrected in a timely manner. The Health and Safety Manager is Mark Smith.

SECTION 2 SUMMARY OF PRIOR UAO ACTIONS AT POND 15S

The RCRA Pond UAO Removal Action Completion Report submitted on June 25, 2013 describes prior gas extraction at Pond 15S in the period 2010 to 2013. Monitoring has been conducted since that time at Pond 15S. The perimeter pipe, appurtenances and perimeter surface scan monitoring results have been reported to EPA in monthly reports pursuant to the UAO.

SECTION 3 GAS EXTRACTION AND TREATMENT DESIGN AND OPERATION

3.1 APPROACH FOR GAS EXTRACTION AND TREATMENT

The purpose of this section is to describe the design and operation of the individual GES unit(s) and the overall approach for gas extraction and treatment at Pond 15S.

Section 3.2 provides a description of the design and operation of a single GES unit. Section 3.3 provides the overall approach for deployment / operation of the GES unit at Pond 15S for the gas extraction and treatment.

3.2 GES UNIT DESIGN AND OPERATION

The GES unit design and operation is described below. Sections 3.2.1 through 3.2.4 were taken from the 18A Interim Work Plan (for) Gas Extraction and Treatment (March 8, 2013) and modified as appropriate for Pond 15S.

3.2.1 Summary of GES Operational Requirements

The GES operator will need to understand the catalytic carbon adsorption system, operate the system correctly, monitor system performance, maintain appropriate records, ensure ongoing preventative maintenance is completed, and replace system components as necessary.

The PH3 gas extraction system extracts pond soil gas from the perimeter gas collection piping by means of a vacuum pump. Gas from the perimeter gas collection piping is blended with fresh air to achieve an inlet gas contraction of about 300 ppm PH3. Draeger Pac III PH3 (or Pac 7000 / X-AM 5000) monitors calibrated to 0-20 ppm and 0-1000 ppm are used for PH3 concentrations. The gas then passes through two carbon filter drums connected in series and is discharged to the atmosphere. Five temperature gauges, four pressure gauges, three flowmeters, and portable PH3 gas monitors are used to indicate operating conditions. An automatic vacuum relief valve, two solenoid valves, a nitrogen fire suppression system, an internal alarm system, and an automatic system control interlock provide safeguards for the system.

Normal Operating Conditions

- The normal blended gas inlet feed rate is 50-80 cfm.
- The normal operating PH3 concentration entering the first drum will be about 300 ppm.
- Maximum operating PH3 concentration entering the first drum will be 1,000 ppm.

- Maximum outlet temperature from the first drum downstream of the vacuum pump shall be 225° F.
- When the PH_3 concentration exiting the first drum reaches 10-15 ppm, the first drum will be replaced (normally by rotating the second carbon drum into the first drum position and replacing the second position with a new drum).
- If the pressure differential across either the first or second drum exceeds 20 inches of water, an inspection of the drum shall be made followed by appropriate action to reduce the pressure differential below 20 inches of water.
- The discharge PH_3 concentration shall be less than 0.3 ppm during normal operation.

Tools and Equipment

- High range portable PH_3 gas monitor. Draeger Pac III (or Draeger X-AM 5000) portable monitor calibrated for 0 to 1000 ppm range.
- Low range portable PH_3 gas monitors. Draeger Pac III (or Draeger PAC 7000) portable monitor calibrated for 0 to 20 ppm range for monitoring low concentrations of PH_3.
- Pipe wrenches, fittings to connect/disconnect piping and instrumentation.
- Parts and tools to perform maintenance on the vacuum pump, piping and instrumentation.
- Barrel mover to move drums

Safety Equipment

- Safety glasses, gloves, and other required PPE
- Cell phone
- Industrial hygiene (IH) personal PH_3 monitor. (ToxiPro A5.7 PH_3 meter with a range of 0-20 ppm PH_3 and alarms set at 0.3 ppm and 1.0 ppm or equivalent monitor.)
- Fire extinguisher

3.2.2 GES Unit System Design And Description

System Operating Criteria

The goal for operation of the carbon adsorption system is to reduce the PH_3 gas concentration to less than 0.3 ppm at the exhaust.

The system equipment described below and the operating procedures provided in later sections of this document are designed to achieve these criteria.

System Equipment and Arrangement

The perimeter gas collection piping was installed at Pond 15S under the final cap liner. The perimeter gas collection piping system was constructed with a 2" perforated PVC pipe inside the perimeter anchor trench. Two collection locations (standpipes) are currently available, one on the east side and one on the southwest side of the pond cap. Both of these locations are available for perimeter piping gas extraction.

The system operating equipment list is:

- Power supply either from utility provider or portable diesel generators.
- An explosion-proof vacuum pump. GAST model R6P355R-50, 3-phase, 480 volt, 60 Hz, 6 hp, maximum capacity 80 cfm, 85" water vacuum, and 100" water pressure. The pump is equipped with automatic vacuum relief valve AG-258, inlet filter AJ151G, motor starter and controller.
- A condensate liquid separator drum.
- Gas inlet flow meters – High range Fox Valve Development Corp. model 617609 venturi flow meter (range 0 to 10 cfm), Low range Fox Valve Development Corp. model 618453 venturi flow meter (range 0 to 2 cfm),
- Total air flow meter – Omega high accuracy pitot tube FPT-6000 series.
- Temperature gauges (3), 0 to 250 F, 4" face, Omega J-0-250F-4-1/2 or equivalent.
- Temperature thermocouples (2), 4", Type K, Omega NB12-CASS-18U-4 or equivalent.
- Temperature indicating controllers (2) with 2 alarm setpoints, Moore 330RD
- Vacuum gauges (2) -60 to 0 " water, McDaniel J60-0, 2½, ¼LM or equivalent
- Pressure gauges (2) 0 to 100 " water, McDaniel J0-100, 2½, ¼LM or equivalent
- Two carbon adsorption drums installed in series. Calgon Centaur™ 4 X 6 activated carbon system in 55-gallon Ventsorb canisters.
- Flow indicators - Wika 732.51 Differential Pressure Gage (316SS wetted; 4" gage; range as needed in inches H_2O) or Equivalent
- A nitrogen purging system.

Fresh Air Blending

Fresh air is required to maintain the inlet gas concentration at about 300 ppm PH3. The blending valve is located near the condensate drum inlet. The blending air valve HV-5 and the source valves HV-1 and HV-2 are adjusted as necessary to blend source gas and fresh air, which serves to dilute the PH3 concentration of the source gas and to control the operating temperature of the GES unit. The PH3 concentration is monitored at the inlet and outlet of the No. 1 carbon drum, as well as at the discharge to atmosphere from the No. 2 drum. The discharge concentration from the No. 2 drum will be maintained at less than 0.3 ppm.

The gas temperature is another indicator of system operation. Temperature gauges are provided at the inlet and outlet of the vacuum pump, and thermocouples are provided at the outlet of the first drum and the outlet of the second drum. The adsorption of PH3 onto the activated carbon is an exothermic (heat-producing) reaction. High inlet concentration of PH3 gas can result in sub-standard adsorption in the first carbon drum, causing a rise in the exit temperature. When the exit temperature from the first drum (TI-4) reaches 225°F, the high temperature interlock will close solenoid valve SV-1 shutting down the source gas extraction from the perimeter gas collection pipe and put the system on an air purge. An alarm will also indicate operator attention is required. If the exit temperature from the first drum (TI-4) or the second drum (TI-5) reaches 250°F, the high-high temperature interlock will close solenoid valve SV-1 and the vacuum pump will automatically shut-down thus stopping gas extraction. The solenoid valve SV-2 (nitrogen purge valve) will open automatically and flush the system for approximately 10 minutes with nitrogen to suppress any reaction and purge PH3 from the system (see Figure 3-1).

Drum Replacement

Monitoring of PH3 concentrations at the inlet and outlet of the first Calgon Ventsorb drum provides an indication of PH3 adsorption performance. When the outlet PH3 concentration of the first drum reaches 10-15 ppm, the drum will be replaced. The standard operating procedure will be to move the second drum to the first position and install a new drum of carbon in the second position.

Pressure gauges are provided at the inlet and outlet of the first drum to measure the pressure drop. Inlet and outlet pressure differential is an indicator of drum performance. When the pressure drop through either the first drum or the second drum is 20 inches of water or greater, an inspection of the drum is required. That inspection may indicate problems requiring drum maintenance (i.e. plugged baffle or piping) or require replacement of the carbon.

Drum Temperature Interlocks

The gas temperature is another indicator of system operation. Temperature gauges are located at the pond gas flow meter, at the inlet and outlet of the vacuum pump, and thermocouples are provided at the outlet of the first drum and the outlet of the second drum. The adsorption of PH3 onto the activated carbon is an exothermic (heat-producing) reaction. High inlet concentration of PH3 gas can result in sub-standard adsorption in the first carbon drum, causing a rise in the exit temperature. When the exit temperature from the first drum (TI-4) reaches 225°F, the high temperature interlock will close solenoid valve SV-1 shutting down the source gas extraction from the perimeter gas collection pipe and put the system on fresh air purge. An alarm will also indicate operator attention is required.

If the exit temperature from the first drum (TI-4) or the second drum (TI-5) reaches 250°F, the high-high temperature interlock will close the source gas solenoid valve SV-1 and the vacuum pump will automatically shut-down thus stopping gas extraction from the standpipe (or extraction manifold). The solenoid valve SV-2 (nitrogen purge valve) will open automatically and flush the system for approximately 10 minutes with nitrogen to suppress any reaction and purge PH3 from the system (see Figure 3-1).

3.2.3 GES Unit Operation

The PH3 gas extraction and treatment system extracts pond gas from perimeter collection pipe by means of a vacuum pump. The gas then passes through two carbon adsorption drums connected in series and discharges to the atmosphere. Fresh air is blended into the system to control the temperature and PH3 concentration. Temperature gauges, pressure gauges, flow meters, and PH3 gas monitors are provided to indicate operating conditions. An automatic vacuum relief valve, thermocouples, alarm systems, and solenoid valves, program logic and a nitrogen suppression system provide safeguards for the system.

Based on the previous successful deployment of multiple GES units at the east and west standpipes at Pond 15S, a similar approach of GES unit deployment at Pond 15S is expected to be sufficient for future gas extraction and treatment at Pond 15S.

The system operation is described below.

The Gas Path

Gas under the Pond 15S cap will be extracted from a gas collection standpipe by suction using fresh air as blending gas. The blended gas stream then passes through a condensate drum to protect the vacuum pump. The vacuum pump exhausts into two carbon adsorption drums operating in series and the treated gas is then discharged to the atmosphere.

Fresh Air Blending

Fresh air is blended with source gas to the gas path to maintain a nominal inlet PH3 concentration of about 300 ppm. The main control valve for blending in fresh air HV-5 is located upstream of the condensate drum a flow meter indicates the amount of source gas that is being introduced.

Temperature Controls

Temperature gauges are located at the pond gas flow meter, at the inlet and outlet of the vacuum pump to indicate temperature. Thermocouples are located at the exit of the first carbon drum and the exit of the second carbon drum. The maximum temperature at the exit of the first carbon drum for normal operation is 225°F.

Pressure Controls

Pressure gauges are located to monitor the pressure differential across the first carbon drum and second carbon drum. The pressure differential across the carbon drums should be less than 20” water for normal operation. Pressure differential readings above 20” water indicate a need to inspect the drum(s) and associated piping.

Phosphine Controls

Phosphine concentrations at the inlet to the first drum, the outlet of the first drum, and the outlet of the second drum are monitored and recorded periodically as well as during start up or prior to shut down. Phosphine monitor connections are located at the inlet and outlet of the first carbon drum and at the outlet of the second drum.

The inlet PH3 concentration at the first drum should be kept at about 300 ppm PH3 for optimum system operation. Hand-held PH3 monitors (Draeger Pac III [or X-AM 5000 / Pac 7000]) calibrated for 0 to 1000 ppm or 0 to 20 ppm PH3 are used for this monitoring. When the outlet concentrations from the first drum reaches 10-15 ppm, the first drum is replaced.

The discharge concentration of PH3 from the second drum should be less than 0.3 ppm PH3 at all times. A hand-held PH3 monitor (Draeger Pac III or Pac 7000) calibrated for 0 to 20 ppm is used for this monitoring. A discharge concentration of 0.2 ppm or more would indicate that the operator needs to adjust (i.e., increase) the amount of fresh air being blended with the perimeter pipe source gas or decrease the flow of the perimeter pipe source gas.

Draeger Pac III [or X-AM 5000 / Pac 7000] portable monitor calibrated for 0 to 1000 ppm or 0 to 20 ppm PH3 is calibrated once every two weeks using factory recommended procedures and calibration gas. Phosphine levels at the blended inlet to the first drum, the outlet of the first drum and the outlet of second drum are monitored at every start-up, prior to shut down and periodic daily operation levels and recorded. Using the combined flow rate, the perimeter pipe extraction rate and the combined concentration, the perimeter pipe PH3 concentration can be estimated.

System Safeguards

1. An automatic vacuum relief valve is located at the inlet to the vacuum pump to prevent excessive vacuum pressure.
2. A control interlock between the thermocouple TI-4 and the solenoid valve SV-1 control the source gas. When the outlet temperature of the first drum at TI-1 reaches 225°F, indicating undesirable adsorption condition, the solenoid valve SV-1 will automatically close to prevent additional pond gas from entering the system leaving the system on air purge. An alarm will also indicate that operator attention is required.
3. An automatic nitrogen purge system with a manual bypass is tied into the discharge from the vacuum pump. The nitrogen system will turn on automatically when the temperature of the first drum or the second drum outlet exceeds 250°F and the vacuum pump will also shut down. This will minimize the potential for any fires or high heat damage in the carbon drums. During an automatic nitrogen system purge, the source gas solenoid valve (SV-1) will automatically close to prevent additional pond gas from entering the system.

3.2.4 Operating Procedures

Start-up Procedure

This procedure is to be followed when starting the system after a normal shut down or when introducing additional units. In the event of an auto shut down or power outage, follow the procedure described in the START UP PROCEDURE AFTER AN AUTO SHUT DOWN OR POWER OUTAGE section of this document.

Follow Health and Safety Plan and RCRA Pond Area Work Rules

1. Identify the standpipe (or collection header port) being used for gas extraction. Verify that all components of the extraction piping upstream of the GES unit are in place and that all components are properly connected as shown on Figure 3-1.
2. Attach the flex hose to the standpipe (or collection header port) and verify that all inlet valves are closed (HV-1, HV-2, HV-3, HV-4, and sample port SPV-3).
3. Use the appropriate portable PH3 monitor to check the system area for PH3. Continue with start up if conditions are satisfactory.

4. Check nitrogen level in the cylinder for the nitrogen fire suppression system. If below ~800 psi, replace the nitrogen cylinder (a full bottle should allow for approximately 3 air exchanges in the system, if needed). Ensure that the nitrogen bottle outlet pressure regulator is set at 30 psi minimum.
5. Check that all hoses, hose connections, filters, piping, and drums are in good working condition. Notify supervisor of any equipment problems **before** proceeding with start up.
6. There are a total of 11 hand valves in the system as shown in Figure 3-1. The operator should ensure the following valves are **CLOSED** to prepare the system for start up:

	Source valve at collection header
SV-1	System inlet solenoid valve (fail close)
HV-1&2	Pond gas throttling valve
HV-3&4	Pond gas block valve
HV-7	Nitrogen purge solenoid bypass valve
SV-2	Nitrogen purge solenoid supply valve (fail close)
SPV-3	Pond gas sample port valve
SPV-1	No. 1 carbon drum inlet sample port valve (PH3-1 on log sheet);
SPV-2	No. 1 carbon drum outlet sample port valve (PH3-2 on log sheet);
HV-8	Condensate drum drain valve.

NOTE: Solenoid valves (SV-1 and SV-2) fail closed with loss of electricity.

7. The operator should ensure that the following valves are **OPEN** to prepare the system for start up:

Nitrogen purge supply block valve at the N2 bottle (normally open)

HV-5 Fresh air blending valve (normally open)

HV-6 Vacuum pump discharge block valve (normally open).

8. Make sure the main circuit breaker at system is on.

NOTE: Once the power is on, it will allow the solenoid valve on the inlet to the condensate drum (SV-1) to operate.

9. Turn on power to the motor starter for the vacuum pump. The system should begin to operate.

   After ensuring proper air flow, allow the system to run for an appropriate period of time to bring the carbon drums up to a steady-state temperature. For initial start-up, this is typically about 2 hours. Connect the appropriate portable PH3 monitor at the sample port at the inlet to No. 1 carbon drum, open valve SPV-1, and monitor to verify that the system is purged of any residual PH3. Verify that the system is functioning properly.

10. Open the source valve at the collection header, open the pond gas block valve HV-3 or HV-4 (depending on high or low flow) and verify that the solenoid valve (SV-1) at the system inlet is open.
11. Slowly open the pond gas throttling valve (HV-1 or HV-2) until the PH3 concentration at No. 1 drum sample port reaches 300 ppm or the No. 2 drum outlet reaches 0.20 ppm max, whichever is first.

    CAUTION: DO NOT EXCEED 1,000 ppm to avoid overheating and damage to the carbon adsorption drums.

12. Adjust and monitor operating conditions – PH3 concentration will normally be targeted at about 300 ppm at the inlet to the No. 1 carbon drum. Adjust the throttling valve (HV-1 or 2) as necessary to regulate temperature and pond gas concentration.
13. Record start up conditions as outlined in the Daily Recording Procedure.

Procedure for Start-up After an Auto Shut Down or Power Outage

Follow Health and Safety Plan and RCRA Pond Area Work Rules

1. Prior to working in extraction system area or collection header areas, use the appropriate portable PH3 monitor to check work areas for PH3.
2. Close the source gas valve at collection header and pond gas throttling valve (HV-1 or 2).
3. Observe all PH3 sample point (PH3-1, PH3-2 and PH3-3) readings.
4. If high PH3 is detected, continue to purge the system using the Nitrogen Suppression Procedure Steps 6 thru 8.
5. Prepare the system for start up as outlined in Steps 6 thru 10 of the standard Start-up Procedure.

6. Observe and monitor the system for 15 minutes for high PH3 at sample ports, elevated temperatures or scorching evidenced by discolored paint, visible smoke, or unusual odors. Return to Step 5 if any of these situations are observed.
7. Allow the system to run on fresh air for an additional 30 minutes or until normal condition is resumed.
8. Continue the standard Start-up Procedure Step 11.

Recording (required daily at standard interval, at start up and prior to shut down.)

1. At start-up, follow the standard Start-up Procedure.
   Record the date, time, operator initials and ambient temperature (T1) on the System Monitoring Log.
2. Connect the appropriate portable PH3 monitor at the inlet of No. 1 carbon drum and slightly open the sample valve (SPV-1) to establish slight flow past the PH3 monitor, record the reading (PH3-1), close the valve, and remove the PH3 monitor.
3. Repeat Step 3 for No. 1 carbon drum outlet (SPV-2) and record the reading (PH3-2).

   CAUTION: Connect the discharge of the sampling monitor to blending air inlet via hose and away from personnel to avoid potential exposure to a low flow of PH3.

4. Repeat Step 3 for No. 2 carbon drum outlet and record the reading (PH3-3).
5. Review and readjust pond gas perimeter pipe throttling valve setting as necessary to maintain normal operating conditions. See the standard START-UP PROCEDURE.
6. Fill out the rest of the System Monitoring Log and check the No. 1 carbon drum condition. Pressure differential between inlet and outlet should be less than 20” of water.
7. If conditions are not within these parameters, shut down the system using Shut Down Procedure and change the No. 1 carbon drum per Drum Changing Procedure.

Shut Down

1. Record the final readings as outlined in the System Monitoring Log.
2. Close the source gas valve at collection header.
3. Allow the inlet hose and the system to run for 30 minutes on fresh air to purge out residual PH3.
4. Connect the appropriate PH3 monitor at the sample port at the inlet to No. 1 carbon drum (SPV-1) and monitor to verify that the system is purged of any residual PH3.

5. Turn off the power to the motor starter for the vacuum pump.
6. Close dilution air valve HV-5.

Drum Changing

1. Shut down the system following the Shut Down Procedure.
2. Unscrew the unions connecting both drums.
3. Remove the first drum and secure it with caps.
4. Relocate the second drum to the first drum position.
   Install a new drum or install a refilled drum to the second drum location.
5. Label each drum with the date of installation and date of removal and record in logbook as appropriate.
6. Re-connect the two active drums.
7. Re-start the system according to Start-up Procedure.
8. Empty the carbon from the drum to an accumulation bin for proper disposal.
9. Save the empty drum to be refilled with fresh activated carbon

Nitrogen Suppression

SAFETY NOTE - When the exit temperature from either drum reaches 250°F, the solenoid valve SV-1 will close and cut off gas intake from the pond gas and the blower will also shut down. The solenoid valve SV-2 (nitrogen purge valve) will open AUTOMATICALLY and flush the system for 5 minutes with nitrogen to suppress any burning reaction (see Figure 3-1).

The following manual procedure is to be used when drum conditions indicate overheating.

1. Shut down the system by turning off power to the motor starter and circuit breaker.
2. Close the source gas valve at collection header and pond gas throttling valve (HV-1 or 2).
3. Close the vacuum pump discharge block valve (HV-6).
4. Verify there is nitrogen available in bottle and the regulator is set at 30 psi.
5. Open the nitrogen solenoid bypass valve (HV-7) to purge the system from No. 1 carbon drum through to the discharge of No. 2 carbon drum.

6. Observe PH3 readings at sample ports (PH3-1, PH3-2, and PH3-3) and temperature (TI-4 and TI-5) and pressure (PI-2 and PI-3) readings.
7. Close nitrogen solenoid bypass valve (HV-7).
8. Open the vacuum pump discharge block valve (HV-6).
9. Re-start the system following the instructions outlined in the Start Up Procedure After an Auto Shut Down or Power Outage Steps 5 thru 9.

3.3 Pond 15S Extraction and Treatment System Operation

Operation of the GES units at Pond 15S will be consistent with prior successful extraction and treatment at Pond 15S. Specifically,

- Continue implementation of gas extraction at Pond 15S on a 12-hour per day, seven days a week (12/7) schedule using four GES units extracting at the southwest standpipe and one GES unit extracting from the east standpipe at Pond 15S. This extraction scheme represents an average PH3 mass removal rate of 6 pounds per day (lb/day), approximately 150% of the net PH3 generation rate estimated for Pond 15S in 2012.
- Implement (or continue to implement) the PH3 monitoring at Pond 15S as described in Sections 4.1 and 4.2.

The operation of the GES unit may be modified over time, based on monthly review of the monitoring data, to increase or decrease the monthly-averaged daily PH3 mass removal rate. Following an initial period of GES unit operation to establish an extraction rate that yields a steady state source gas concentration, estimated to take 30-60 days based on initial extraction at Pond 15S and other ponds, adjustments will be made to maintain the perimeter pipe concentrations below 10,000 ppm. In addition, decreasing the monthly-averaged daily PH3 mass removal rate may be necessary to maintain efficient GETS operation, e.g., maintain 300 ppm inlet PH3 concentrations. The rate of PH3 removal from the perimeter pipe will be increased by: (1) adding additional GES units extracting from the perimeter pipe outlet(s) and/or (2) increasing the operating time of the current GES unit(s) if not currently operating 24/7. The rate of PH3 removal from the perimeter pipe may be decreased by: (1) reducing the number of GES units extracting from the perimeter pipe outlet(s), (2) discontinuing extraction at additional perimeter pipe outlets (if available and extraction was in progress), or (3) reducing the operating time of the current GES units. FMC will notify EPA and obtain EPA approval prior to increasing or decreasing the number of GES units deployed at Pond 15S.

As has been experienced at TMPs, the TMPs can become flow restricted as a result of a quantity of sand pack material (used during TMP installation) plugging the bottom of the TMP. If necessary to facilitate gas extraction from a TMP(s) using a GES unit(s), a TMP cleaning/drilling procedure has been developed to allow for the safe removal of the sand pack material and drilling through the bottom of the TMP casing in order to establish or re-establish flow at the plugged TMP. The TMP Mechanical Drilling Procedure (Updated May 24, 2012) is included as Appendix A.

Should the monthly GES unit source gas PH3 concentration at both standpipes decrease below 2,000 ppm as measured using the dilution box method specified in Section 4.2.2, FMC will notify EPA and cease gas extraction and treatment at Pond 15S. Monitoring will continue pursuant to the then-applicable EPA-approved plan (e.g., this Readily Implementable Work Plan or an amended RCRA Pond Post-Closure Plan).

3.4 WASTE MANAGEMENT

Based upon experience with GES unit extraction from perimeter pipe standpipes, generation of the following solid wastes are anticipated for the Pond 15S GES unit operation:

- Spent carbon;
- Condensate; and
- Maintenance debris.

These anticipated solid waste streams are discussed below.

Spent Carbon

Approximately 300 pounds of spent activated carbon are anticipated to be generated each time a carbon drum is replaced. The point of generation of this waste stream will be upon removal of the spent carbon from the carbon drum. Based upon testing, process knowledge, and experience with the existing gas extraction and treatment systems, the spent carbon is not anticipated to be a hazardous waste per 40 CFR Part 261. However, a periodic waste determination will be performed and documented per 40 CFR § 262.11.

Condensate

Condensate may be generated during operation of the treatment system. The point of generation of this waste stream will be upon removal of the condensate from the GES system piping. Based upon testing, process knowledge, and experience with the existing gas extraction and treatment systems, the condensate is not anticipated to be a hazardous waste per 40 CFR Part 261. However, a periodic waste determination will be performed and documented per 40 CFR § 262.11.

Maintenance Debris

Varying amounts of maintenance debris is anticipated to be generated from the operation of the GES unit. The point of generation of these waste streams will be upon the point of disposal. Although these wastes are not anticipated to be hazardous per 40 CFR Part 261, a waste determination will be performed and documented per 40 CFR § 262.11 with the initial generation of each waste category, i.e., packaging materials, replaced equipment, monitoring wastes, spent PPE, etc.

Wastes that have been determined to be non-hazardous per 40 CFR § 262.11 will be either disposed on site or transported offsite for recycle or disposal. Wastes that are determined to be hazardous per 40 CFR § 262.11 will be managed in accordance with the regulatory requirements of 40 CFR Part 262, 265, and 268 including but not limited to:

- Land disposal restrictions per 40 CFR Part 268;
- EPA identification number per 40 CFR Part 262.12;
- On-site hazardous waste accumulation (storage) per 40 CFR § 262.34(d);
- If the waste is placed in containers, the requirements of 40 CFR Part 265 Subpart I;
- If the waste is placed in tanks, the requirements of 40 CFR 265 Subpart J (tank requirements):
- At closure, the storage area is closed per the requirements of 40 CFR § 265.111 and 40 CFR § 265.114;
- Preparedness and prevention requirements of 40 CFR Part 265 Subpart C;
- Contingency plan and emergency response requirements of 40 CFR Part 265 Subpart D;
- Training requirements of 40 CFR § 265.16;
- Satellite accumulation requirements of 40 CFR § 262.34(c);
- Manifesting off-site shipments of hazardous per 40 CFR § 262.20; and/or
- Reporting and recordkeeping per 40 CFR § 262.40.

SECTION 4 MONITORING AND REPORTING

4.1 MONITORING UNDER THE AIR MONITORING PLAN

Monitoring pursuant to the Air Monitoring Plan as applied to Pond 15S per this RIWP will be performed at Pond 15S during and after ceasing gas extraction and treatment. A summary and schedule for the PH3 monitoring at Pond 15S is shown on Table 4-1. The monitoring will be performed following the procedures detailed in the Air Monitoring Plan (January 2011).

- Air Monitoring per the Air Monitoring Plan – Part I
  - Pond appurtenance air monitoring and leak detection monitoring at the 10 TMP enclosures, 2 ET cap drainage collection lift stations, 4 LCDRS sump, 3 instrument panels and 2 standpipes at Pond 15S will initially be performed on a monthly basis upon commencement of and during gas extraction and treatment. Following ceasing gas extraction and treatment per the criteria in Section 3.3, appurtenance monitoring will revert to quarterly. If, based on quarterly perimeter pipe monitoring, the PH3 concentration in one or more standpipes is greater than 2,000 ppm, appurtenance monitoring will be performed monthly until the perimeter pipe PH3 concentrations return to below 2,000 ppm. When perimeter pipe PH3 concentrations are below 2,000 ppm, monitoring will be quarterly. After four (4) consecutive quarters of appurtenance monitoring, if there have been no detections of PH3 at or above 0.05 ppm of PH3 at any appurtenance, the frequency will be reduced to annually for Pond 15S unless the perimeter pipe PH3 concentration is above 2,000 ppm. The Pond 15S appurtenance monitoring locations are shown on Figure 4-1.
  - Pond perimeter surface scan monitoring will be performed at Pond 15S on a monthly basis, provided that required weather and/or ground surface conditions allow such monitoring during the month upon commencement of and during gas extraction and treatment. Following ceasing gas extraction and treatment per the criteria in Section 3.3, perimeter surface scan monitoring will revert to quarterly. If, based on quarterly perimeter pipe monitoring, the PH3 concentration in one or more standpipes is greater than 2,000 ppm, perimeter surface scan monitoring will be performed monthly until the perimeter pipe PH3 concentrations return to below 2,000 ppm. When perimeter pipe PH3 concentrations are below 2,000 ppm, monitoring will be quarterly. After four (4) consecutive quarters of cap perimeter surface monitoring, if there are no PH3 detections at or above 0.05 ppm of PH3 at the cap perimeter surface, this monitoring frequency will be reduced to

annually on Pond 15S unless the perimeter pipe PH3 concentration is above 2,000 ppm. The Pond 15S surface scan monitoring locations are shown on Figure 4-2.

  - Pond cap surface scan – if triggered by pond perimeter surface scan.
  - Low-lying areas – if triggered by monitoring listed in previous three sub-bullets.

- Air Monitoring per the Air Monitoring Plan – Part II
  - Continuous monitoring at four locations at Pond 15S (the same EPA approved locations during prior gas extraction and treatment at Pond 15S). Continuous monitoring will be performed during periods when the GES unit(s) is (are) extracting pond gas. The Pond 15S continuous monitoring station locations are shown on Figure 4-3.
  - Fenceline monitoring - if triggered by criteria set forth in the Air Monitoring Plan; and Off-site monitoring – if triggered by fenceline monitoring criteria set forth in the Air Monitoring Plan.

In addition to the above Air Monitoring Plan monitoring, inside appurtenance monitoring will be performed on the same frequency as the appurtenance air monitoring and leak detection monitoring. Note that there is no inside monitoring at perimeter pipe standpipes. The inside appurtenance monitoring will be performed following the procedures detailed in Section 3.4 of the Phosphine Assessment Work Plan – Final (July 2011).

4.2 GES Unit Operation Monitoring

In addition to the air monitoring specified in Section 4.1, GES unit operation and source gas (perimeter pipe) monitoring will be performed during gas extraction and treatment at Pond 15S. The monitoring described in this section is in addition to the gas extraction and treatment system(s) operational monitoring described in Section 3.2.4.

4.2.1 Pond 15S GES Unit Tailgas PH3 Monitoring

Each gas extraction and treatment system (GES) will be monitored to ensure that the tailgas (discharge of the treatment system) remains below 0.3 ppm PH3. In order to ensure GES tailgas compliance, the tailgas will be monitored regularly for concentrations of PH3 with a hand-held Draeger Pac III (or Draeger PAC 7000) meter (0 to 20 ppm range). This will be performed by holding the Draeger Pac III meter sample inlet in the tailgas discharge stream at least three times per operating shift during operation of the GES unit. The tailgas PH3 concentration will be recorded on the operator logsheet immediately after each reading.

4.2.1.1 Tailgas Sampling Procedure during Normal Operation

Normal operational periods are those during which the system is operating steadily at the intended capacity. These are periods when it would be expected that the GES unit is performing relatively consistently over time. As stated above, during these periods, tailgas monitoring will be conducted three times per operating shift. The monitoring procedure is as follows:

- Ensure that the Draeger Pac III (or Pac 7000) is setup with the 0 to 20 ppm hydride gas sensor (measures PH3 and similar compounds) sensor and has warmed up for at least 15 minutes.

- Ensure that calibration is current, as indicated by the sticker placed on meter during most recent calibration (instruments calibrated every two weeks).

- Check work area for PH3 leaks and continue monitoring throughout the sample collection activities. If PH3 leaks are observed, move upwind, document the observed PH3 leak and call the supervisor to complete a PH3 investigation and associated maintenance actions. Re-start sampling (i.e., re-collect the sample that was interrupted by detection of the leak) when conditions are suitable for sampling.

- Hold PH3 monitor with its sensor directed into the GES unit tail gas stream (i.e., exhaust pipe from second drum).

- Record stable PH3 concentration reading.

During routine operational periods, operators will make adjustments to the process if any tailgas reading exceeds 0.20 ppm PH3. This “action level” provides a buffer of another 50 percent increase in discharge concentration before reaching the maximum of 0.3 ppm PH3, which is the OSHA 8-hour PEL.

4.2.1.2 Tailgas Sampling Procedure during Non-Routine Operation

Non-routine periods of operation cover, at a minimum, the following circumstances:

- Initial system start-up

- New carbon vessel conditioning period following carbon change-out

- Operation during which process gas contributions and/or inlet PH3 concentrations to the treatment system are significantly changed or increased

During non-routine operational periods, the system requires additional monitoring in order to ensure that the tailgas PH3 concentration remains below 0.3 ppm. With respect to conducting PH3 tailgas concentration measurements, the operator(s) will follow the same procedure that was described in Section 4.2.1.1. However, because of the somewhat transient nature of non-routine operations, readings will be taken more frequently after a process change until the system is steadily operating at the intended capacity. For example, after a carbon change-out and the new carbon vessel is brought on-line, tailgas will be monitored at least once an hour until the carbon is determined to be conditioned. The typical procedure to condition carbon after a carbon change is to run the system on fresh air only for at least 2 hours to allow the carbon to warm to operating temperatures. Then PH3 is introduced to the system at a reduced level, typically 100 ppm to the inlet of the first carbon drum. After acceptable performance is demonstrated at the reduced PH3 level the concentration is slowly increased to the target inlet concentration of 300 ppm. This start-up period may require 6 to 24 hours total time to achieve normal operation. As described for routine operation, during non-routine operational periods such as after a carbon change-out, operators will make correctional adjustments to the process if any tailgas reading exceeds 0.20 ppm PH3. This “action level” provides a buffer of another 50 percent increase in discharge concentration before reaching the maximum of 0.3 ppm PH3, which is the OSHA 8-hour PEL.

4.2.2 Pond 15S Perimeter Piping Gas PH3 Monitoring

During the operational phase, ongoing operational data from the GES unit(s) will be collected and used to calculate and track the PH3 concentration in the perimeter pipe stand pipe(s) (i.e., the source gas PH3 concentration).

Should the GES unit operational data indicates the perimeter pipe PH3 concentration has decreased to below 2,000 ppm, a sample of GES inlet gas will be measured using the calibrated dilution manifold box method to confirm the perimeter pipe source gas concentration is below 2,000 ppm at both the east and southwest standpipes.

Following ceasing gas extraction and treatment per the criteria in Section 3.3, perimeter pipe monitoring will revert to quarterly. If, based on quarterly perimeter pipe monitoring, the PH3 concentration in one or more standpipes is greater than 2,000 ppm, perimeter pipe monitoring will be performed monthly until the perimeter pipe PH3 concentrations return to below 2,000 ppm. When perimeter pipe PH3 concentrations are below 2,000 ppm, monitoring will be quarterly.

4.2.2.1 Sampling Train Calibration Prior to the Perimeter Piping Monitoring Event

Calibrate Draeger Pac III PH3 Monitor: The Draeger Pac III field monitor[1] (0 to 1,000 ppm) will have been calibrated with 500 ppm PH3 standard calibration gas within 14 days prior to any perimeter piping monitoring event.

Calibrate Sample Train Dilution Box: Also, within 14 days prior to any perimeter piping sampling event, the sampling train dilution box will be calibrated using 500 ppm PH3 standard calibration gas and using various dilution ratios (N2 to PH3) to confirm the accuracy of the dilution box.

To avoid release of PH3 to the environment, the PH3 calibration gas used in this calibration procedure will be collected in a Tedlar bag. The Tedlar bag will then be discharged to an operating GES for treatment prior to release to atmosphere.

The perimeter piping sampling train calibration procedure follows:

1. Calibrate the Draeger Pac III PH3 monitor.
2. Position perimeter piping sampling train in the sampling lab. The equipment includes:
   - Gas dilution manifold
   - High-range (0 to 1,000 ppm) Draeger Pac III PH3 monitor equipped with a Draeger calibration cap.
   - Nitrogen gas cylinder for sample dilution
   - PH3 calibration gas cylinder (500 ppm)
   - Tedlar bag for the collection of gas discharged from the Draeger Pac III monitor.
   - Mass flow meters in the dilution manifold indicate the flow rate of calibration gas and dilution gas (nitrogen). The combined total flow of the PH3 calibration gas and any nitrogen dilution gas should be approximately 500

[1] Draeger has discontinued manufacturing the Pac III monitors but according to a Draeger representative they will continue to provide sensors and basic repairs for the Pac III. The Pac III is being replaced by the Draeger Pac 7000 for the low range PH3 sensor (0 – 20 ppm) and the by the X-AM 5000 for the high-range PH3 sensor (0-1,000 ppm). FMC may utilize the Pac III, Pac 7000, X-AM 5000 or equivalent monitors for the gas monitoring program.

SCCM. This is the flow for which the Draeger Pac III calibration cap is designed.

3. Connect the nitrogen dilution gas to the designated flow meter on the dilution box.
4. Connect the PH3 calibration gas to the designated flow meter on the dilution box.
5. Connect the Draeger Pac III PH3 monitor (0 to 1,000 ppm range) to the discharge line from the dilution box.
6. Connect the exhaust tubing from the Draeger Pac III PH3 monitor calibration cap to the inlet port of a Tedlar bag. Open the inlet valve on the Tedlar bag.
7. Begin dilution box calibration by opening the valve to the PH3 calibration gas line only and start sampling using only calibration gas at a flow of approximately 500 SCCM. After the Draeger monitor reading has stabilized, record the base line PH3 concentration.
8. Repeat the previous step using both PH3 calibration gas and nitrogen dilution gas connected to the dilution box. Adjust the flow rates of both the PH3 calibration gas and nitrogen dilution gas to ratios of approximately 0.5:1, 1:1, 2:1, and 3:1. Record the flow rates. The total gas flow of PH3 calibration gas and nitrogen dilution gas should be approximately 500 SCCM (specified by Draeger for their PH3 monitors). Record the Draeger monitor PH3 concentration for each dilution ratio.
9. After the calibration is completed, close the valve to the PH3 calibration gas line and disconnect the line. Allow the nitrogen dilution gas to run until the sampling equipment has been purged into the Tedlar bag.
10. After the sampling equipment is purged, then close the valve to the nitrogen dilution gas and disconnect the line. Close the Tedlar bag inlet. (The contents of the Tedlar bag must be discharged back into an operating GES unit.)
11. Calculate the source gas concentration using data collected from Step 9.

    Calculated source gas concentration = (Draeger reading) x [(N2 flow + PH3 flow) / PH3 flow].

12. Compare the calculated source gas concentration with the baseline concentration and compute % error.

    Error = [(Calculated source gas ppm – Baseline ppm) / Baseline ppm] x 100

13. If the average % error is less than 5%, then the dilution box calibration is complete and the perimeter piping sample train is considered to be within acceptable tolerance limits.

4.2.2.2 Perimeter Gas Collection Piping PH3 Sampling Procedure using Dilution Box

The procedure for measuring the east perimeter pipe standpipe PH_3 concentration using the dilution manifold box method is described below.

1. Position the gas sampling train near the perimeter pipe sampling port. The sampling train consists of:

    - GeoTech peristaltic sampling pump
    - Gas dilution manifold assembly
    - High-range (0 to 1,000 ppm) Draeger PAC III PH_3 monitor equipped with a Draeger calibration cap.
    - Nitrogen gas cylinder for sample dilution
    - Discharge tubing connected to the dilution air inlet or a tedlar bag for collection of the sampled pond gas

2. The gas dilution manifold should always be used in the perimeter piping gas sampling train. However:

    a) If the PH_3 measurement from the perimeter piping is expected to be below 1,000 ppm (the limit of the high-range Draeger PAC III PH_3 monitor), then the pond gas can be sampled directly through the dilution/mixing manifold without any dilution.
    b) If the PH_3 concentration is expected to be above 1,000 ppm, then the pond gas will be diluted with nitrogen using the dilution manifold as appropriate to ensure the diluted sample PH_3 concentration is below 1,000 ppm.

3. Mass flow meters in the dilution/mixing manifold indicate the flow rate of pond gas and dilution gas (nitrogen). The combined total flow extracted from the perimeter piping plus any dilution gas should be approximately 500 ml/min. This is the flow for which the Draeger PAC III calibration cap is designed.

4. Connect the suction side of the GeoTech sampling pump to the appropriate sampling port. Connect the discharge side of the GeoTech sampling pump to the designated dilution/mixing manifold mass flow meter (this is the pond gas containing PH_3 to be measured).

5. Connect the nitrogen dilution gas, if required, to the designated flow meter on the manifold.

6. Connect the Draeger PAC III 0 to 1,000 ppm PH_3 monitor properly to the discharge line from the dilution/mixing manifold.

7. Position the exhaust tubing from the Draeger PAC III PH3 monitor calibration cap to the inlet port of the eductor feeding the GES. This will ensure the expelled gas is treated through the GES prior to discharge.

8. Begin sampling pond gas by opening the sampling valve to the perimeter piping sample train and start the sampling pump.

9. Adjust the flow rates of pond gas and the nitrogen gas (if needed) through the dilution/mixing manifold flow meters as required to meet the appropriate dilution ratio. The total gas flow of pond gas and nitrogen dilution gas should be approximately 500 ml/min (as specified by Draeger for their PH3 monitors).

10. Monitor the digital display of the Draeger PAC III PH3 monitor. When the PH3 readings have stabilized, record the Draeger monitor PH3 readings, the dilution/mixing manifold gas flow rates, and the calculated PH3 concentration corrected for any dilution.

11. Record 3 consecutive data sets, about 10 minutes apart. Record the data on the perimeter piping sampling log sheet. Calculate the average from the 3 data sets.

12. After the sampling is completed from the perimeter piping, close the sample port valve and disconnect the sample hose. Allow the sample pump to run on fresh air until the sampling equipment has been purged into the eductor inlet port feeding the GES.

13. After the sampling equipment is purged, then turn off the sampling pump.

4.3 DATA ANALYSIS AND REPORT PREPARATION

GES unit operational status and monitoring and operational data will be reported in the weekly/monthly UAO reports.

4.3.1 Report Content and Submittal

The operational status and monitoring activities will typically be reported in the UAO weekly reports. The weekly reports will include the following:

- Operational status during the reporting week;
- Tabulated continuous monitoring data for the current week; and,
- Problems encountered and solutions proposed/implemented.

In addition to the above information, the monthly UAO reports will include:

- Monitoring results;
- Summary of process operational parameters; and,
- Operational objectives and any recommendations for changes to the GES unit operating schedule and/or deployment of GES units during the upcoming month.

Table 4-1 Phosphine Monitoring Schedule for Pond 15S

Perimeter Pipe PH3 Concentration Range[1]	Monitoring Program and Schedule				Response If Appurtenance AA and LD reading ≥ 0.05 ppm and/or Inside ≥ 1.0 ppm; and/or perimeter surace scan reading ≥ 0.05 ppm	Response If Inside Appurtenance Reading ≥ 10 ppm	Response If Appurtenance AA reading ≥ 0.30 ppm and/or LD reading ≥ 1.00 ppm and/or Inside Appurtenance reading ≥ 35 ppm
	Appurtenances	Perimeter Surface Scan	Perimeter Pipe	Continuous Monitoring			
During Gas Extraction and Treatment							
≥ 2,000 ppm	Monthly	Monthly	GES operational data - monthly average.	During periods of source gas extraction.	Perform maintenance and remonitor within 10 days and continue monitoring.	Perform maintenance and remonitor within 10 days and continue monitoring.	Perform maintenance and remonitor within 10 days. If remonitoring reading ≥ trigger levels, increase gas extraction PH3 mass removal rate.
Post Gas Extraction and Treatment							
< 2,000 ppm	Monthly	Monthly	Quarterly	Not applicable	Perform maintenance and remonitor within 10 days and continue monitoring.	Perform maintenance and remonitor within 10 days[2]. Perform perimeter pipe monitoring within 10 days. If perimeter pipe concentration in higher range, implement monthly monitoring.	Perform maintenance and remonitor within 10 days. Begin gas extraction and treatment within 10 days.
	If prior 12 consecutive months, AA and LD ≤ 0.05 ppm, monitoring quarterly.	If prior 12 consecutive months, scan results ≤ 0.05 ppm, monitoring quarterly.			Perform maintenance and remonitor within 10 days[2] and continue monitoring. If post-maintenance result ≥0.05 ppm, revert to monthly.		
	If prior 4 consecutive quarters, AA and LD ≤ 0.05 ppm, monitoring annually.	If prior 4 consecutive quarters, scan results ≤ 0.05 ppm, monitoring annually.			Perform maintenance and remonitor within 10 days[2] and continue monitoring. If post-maintenance result ≥0.05 ppm, revert to quarterly.		
2,000-9,999 ppm[3]	Monthly	Monthly	Monthly		Perform maintenance and remonitor within 10 days and continue monitoring.	Perform maintenance and remonitor within 10 days and continue monitoring.	

Appurtenance AA means Ambient Air and LD means Leak Detection.

(1) Based on highest PH3 concentration standpipe for ponds with multiple standpipes.

(2) If the "within 10 day re-monitoring" outside appurtenance reading(s) are less than 0.05 ppm and the inside reading(s) are less than 0.3 ppm, then remonitor one month from initial exceedance (if on quarterly or annual monitoring frequency).

(3) If perimeter pipe concentration > 9,999 ppm, re-initiate gas extraction and treatment within 10 days.

SECTION 5 SUMMARY OF PLAN AND SCHEDULE

In summary, the readily implementable plan for gas extraction and treatment at Pond 15S is as follows:

- Continue implementation of gas extraction at Pond 15S on a 12-hour per day, seven days a week (12/7) schedule using four GES units extracting at the southwest standpipe and one GES unit extracting from the east standpipe at Pond 15S.
- Implement (or continue to implement) the PH3 monitoring at Pond 15S as described in Sections 4.1 and 4.2.

As described in the Framework for Post-Closure Operation and Maintenance of RCRA Pond Gas Extraction and Treatment Systems (December 2012), the gas extraction and treatment approach as described above on Pond 15S standpipes operating on a 12/7 schedule will achieve a minimum monthly-averaged PH3 mass removal rate of 6 pounds per day (lb/day) provided the source gas PH3 concentration at the southwest standpipe remains above 2,000 ppm.

The operation of the GES unit may be modified over time, based on monthly average monitoring data, to increase or decrease the monthly-averaged daily PH3 mass removal rate. Following an initial period of GES unit operation to establish an extraction rate that yields a steady state source gas concentration, estimated to take 30-60 days based on initial extraction at Pond 15S and other ponds, adjustments will be made to maintain the perimeter pipe concentrations below 10,000 ppm. In addition, decreasing the monthly-averaged daily PH3 mass removal rate may be necessary to maintain efficient GETS operation, e.g., maintain 300 ppm inlet PH3 concentrations. FMC will notify EPA and obtain EPA approval prior to changing the GES unit operating schedule and/or deployment of GES units at Pond 15S.

Should the monthly GES unit source gas PH3 concentrations at both standpipes decreases below 2,000 ppm as measured using the dilution box method specified in Section 4.2.2, FMC will notify EPA and cease gas extraction and treatment at Pond 15S. Monitoring will continue pursuant to the then-applicable EPA-approved plan (e.g., this Readily Implementable Work Plan or an amended RCRA Pond Post-Closure Plan).

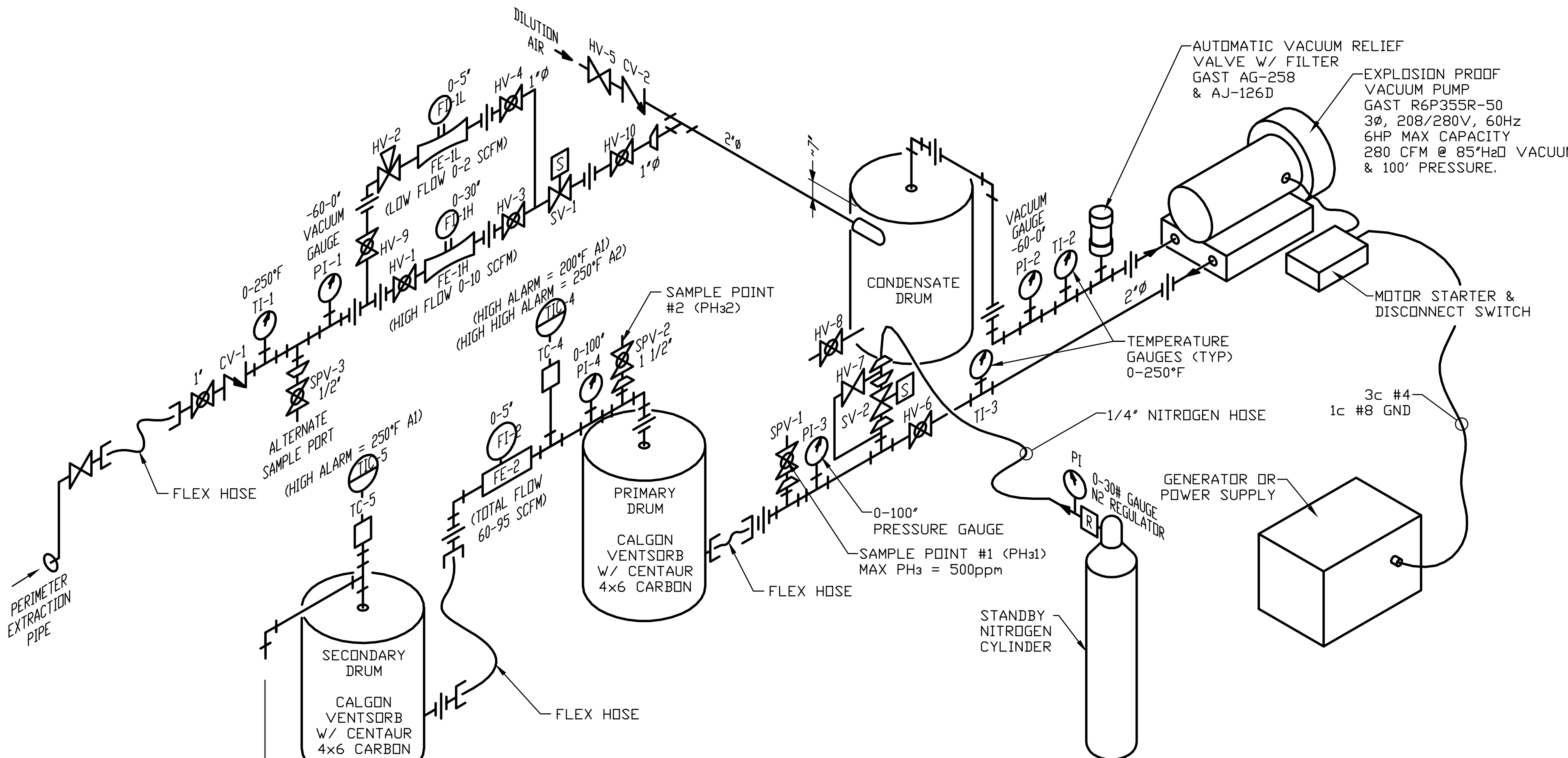

FIGURE 3-1

SCHEMATIC DIAGRAM
GAS EXTRACTION AND TRETMENT SYSTEM
FOR POND 18A
PERIMETER PIPE EXTRACTION

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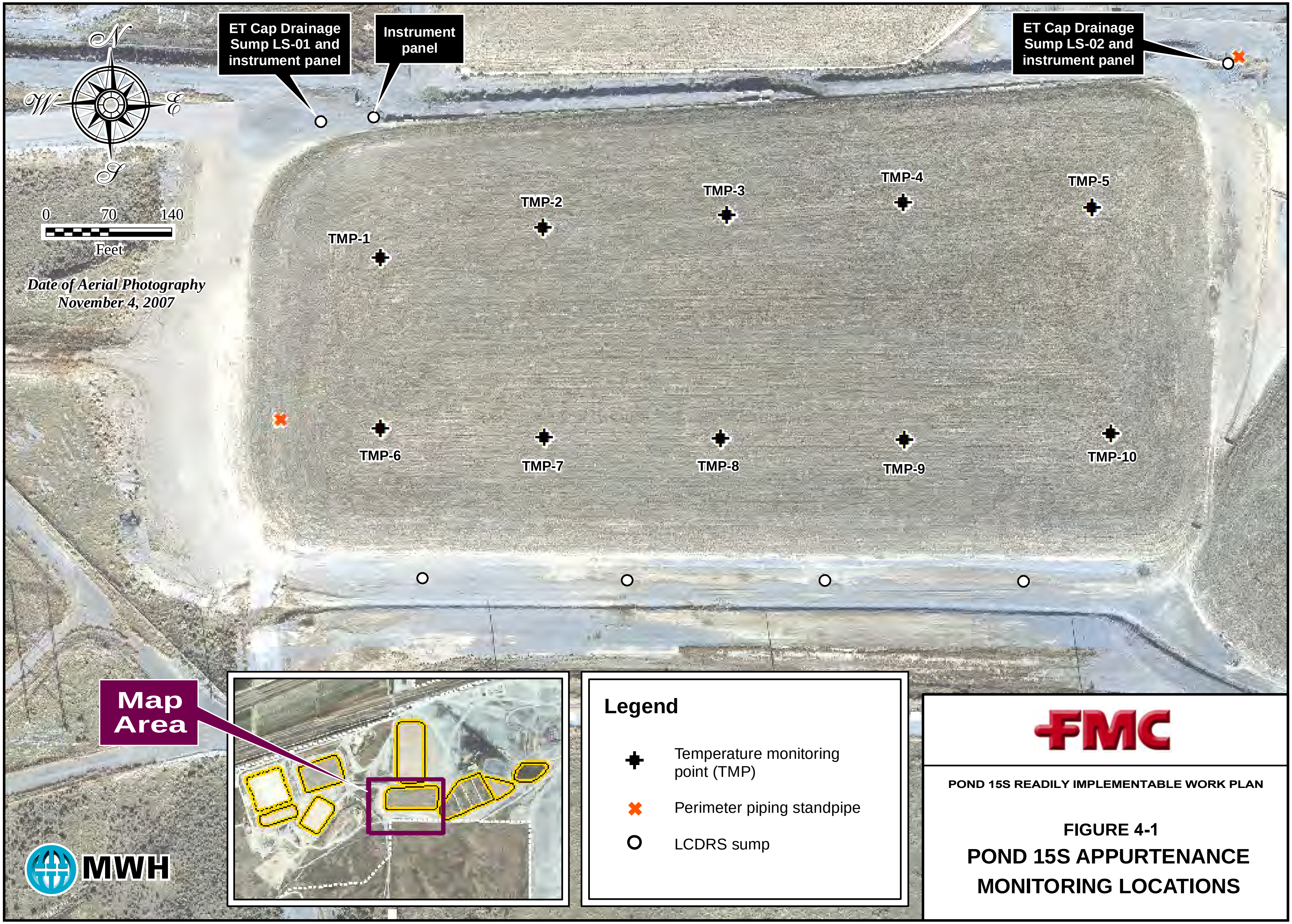

FMC

POND 15S READILY IMPLEMENTABLE WORK PLAN

FIGURE 4-1
POND 15S APPURTENANCE MONITORING LOCATIONS

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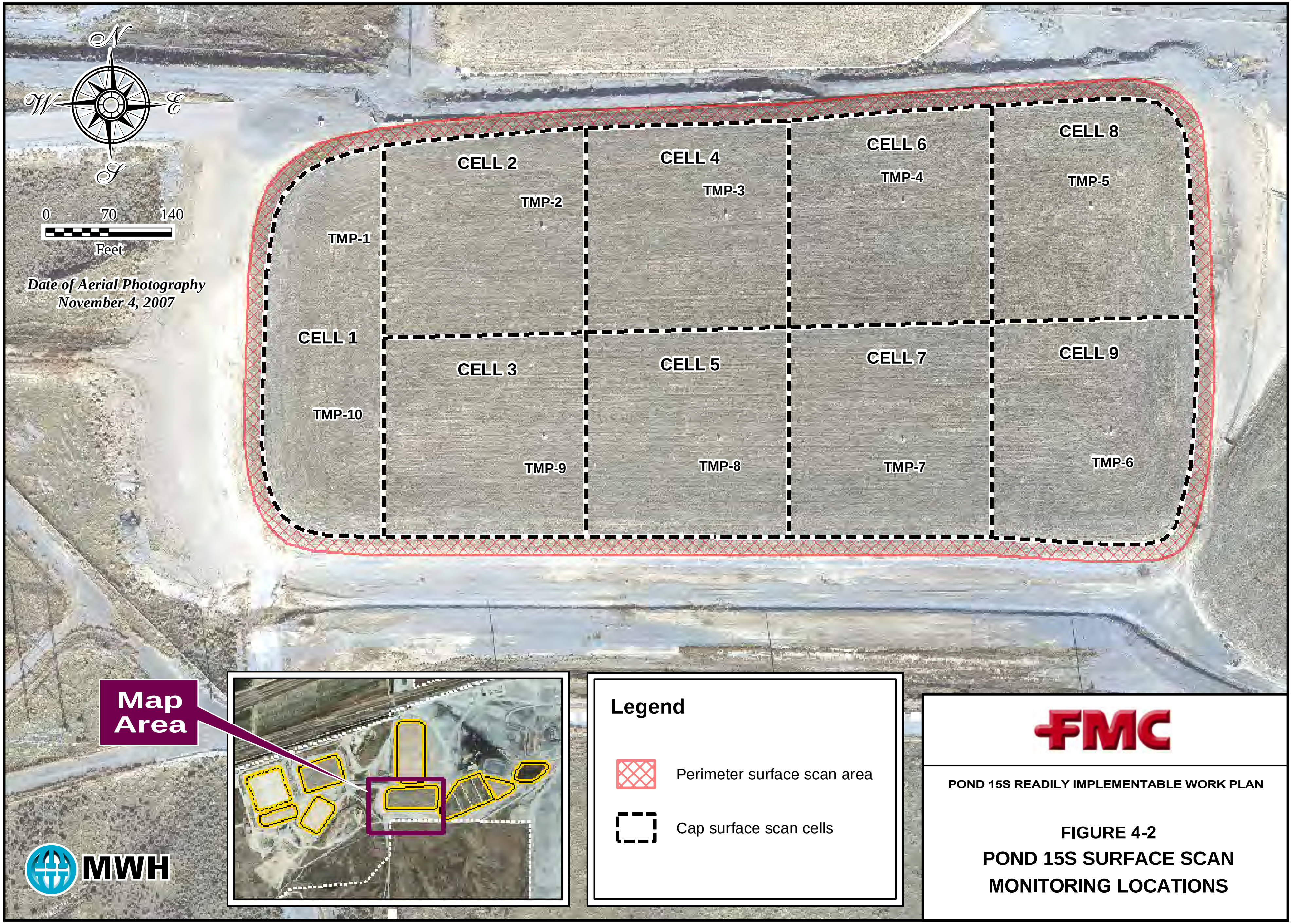

POND 15S READILY IMPLEMENTABLE WORK PLAN

FIGURE 4-2
POND 15S SURFACE SCAN
MONITORING LOCATIONS

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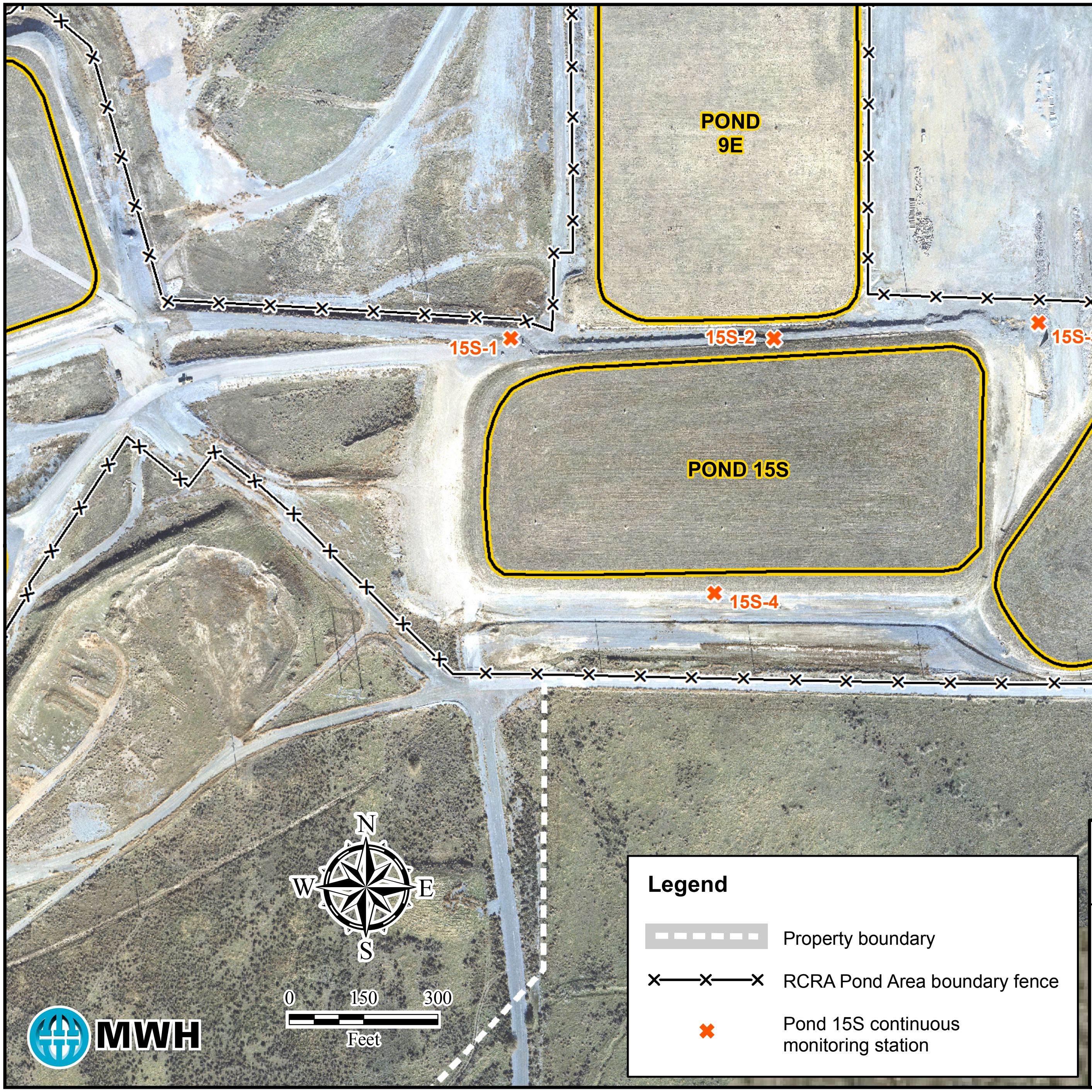

FMC

POND 15S READILY IMPLEMENTABLE WORK PLAN

FIGURE 4-3

POND 15S CONTINUOUS MONITORING STATION LOCATIONS

Pond 15S Readily Implementable Work Plan

Appendix A

TMP Mechanical Drilling Procedure

TMP MECHANICAL DRILLING PROCEDURE

1. Complete Job Planning Safety Analysis (JPSA) for drilling of specific TMP:

   a. Identify potential job hazards.
   b. Prescribe appropriate monitoring during the procedure, i.e., PH3 monitoring.
   c. Prescribe appropriate PPE for employees performing procedure.

2. Prepare TMP for drilling:

   a. Remove TMP enclosure to provide access to TMP piping.
   b. Connect the mobile GES unit (with high-range flow meter) to the extraction connection on the TMP casing.
   c. Utilizing the sample port connection on the GES extraction piping, begin nitrogen purging into the TMP casing. Purge down the TMP until at least four conduit volumes have been purged through the TMP.
   d. Stop nitrogen purge and begin sweep gas flow using the mobile GES.
   e. Remove TMP thermocouple from TMP well. Note the length of the stainless-steel sheath removed from the casing.
   f. Continue sweep gas flow using the mobile GES.

3. Construct drill assembly:

   a. Build a drill assembly of the required length based on the length of the thermocouple sheath removed from the TMP well.
   b. The final section of the drill assembly must be the 12-inch drill adaptor rod designed to attach to the rotor-hammer drill.

4. Drill hole in bottom of TMP casing

   a. Insert drill assembly into ¾-inch thermocouple conduit.
   b. Accurately note the depth when the drill bit contacts the bottom of the casing.
   c. Attach rotor-hammer drill to drill bit adaptor assembly.
   d. Slowly begin drilling (whenever any binding is observed the drill will be reversed to relieve the binding).
   g. Track the drilling progress (It is expected that 2 to 3 inches of drilling will be required to completely break-through the drive cap bottom of the TMP casing).
   h. Stop drilling when break-through occurs. The design of the drilling coupling will prevent penetration beyond 10 inches below the drive cap.

5. Remove drill assembly from TMP well casing and observe the drill bit to determine bottom of drive cap condition (i.e. dry or wet).

6. Determine the TMP "max" flow capability:

   a. Install blind flange on the top flange of the TMP casing.
   b. Determine "max" flow capability utilizing the mobile GES.
   c. If desired extraction flow is possible then re-install TMP thermocouple (Step 7).
   d. If desired flow is not possible then it may be necessary to repeat Steps 2 thru 6.

7. Re-install TMP thermocouple:

   a. Shut off gas extraction through the mobile GES.
   b. Utilizing the sample port connection on the GES extraction piping, begin nitrogen purging into the TMP casing. Purge down the TMP until at least four conduit volumes have been purged through the TMP.
   c. Loosen bolts on blind flange on the top of the TMP.
   d. Re-establish the sweep gas flow utilizing the mobile GES.
   e. Remove the blind flange on the top flange of the TMP casing and re-install the TMP thermocouple with flange.
   f. Replace and secure the TMP enclosure.